

I have here a chart* showing all the observations that have been sent me, from which it can be judged how far the interpolating curve adopted is a fair representation of them; and a roughly drawn chart marking the positions of the stars at different dates, and the supposed hyperbolic arc on which they lie. The deviation of the curve from the early positions is great, but they rest on very few observations, as is seen from the other chart, and several of the early observations, as of the late ones, are many degrees in error.

It occurred to Mr. Seabroke and myself that it would be worth while to examine the spectra of A and B, to see whether the indication derived from the orbit, that they belonged to different systems, was confirmed; but the long delay of an optician in preparing part of the necessary apparatus has frustrated us for the present.

There appears to be something peculiar about the motion of this pair. Every successive determination of the eccentricity of the relative orbit has increased that eccentricity, as shown by Mr. Proctor in his note on my former paper. It may be thought worth while, by some one with more skill or more leisure than I possess, to subject the orbit to a searching examination, and this is my object in bringing the matter in a confessedly unfinished state before the Society.

My own conclusion is, that it is now probable that the orbit is really hyperbolic.† If so, *Castor* must be looked on, not as a binary system, but as two stars, whose relative proper motions have been in nearly opposite directions, and whose near approach has been witnessed once, and will never be witnessed again.

*Temple Observatory,
Rugby, June 14, 1872.*

On the Desirability of Watching for the November Meteors in the present year. By Rich. A. Proctor, B.A. (Cambridge.)

On the night of November 13-14, 1871, no members of the November meteor system were observed in England; and the conclusion was arrived at that the richer portion of the system has passed so completely beyond the Earth's orbit that no displays may be expected until the close of the century. Mr. Glaisher, in fact, promised his meteor-observing assistants at Greenwich that they should no longer be kept on the watch after midnight on November 13-14. There are reasons for believing, however, that the conclusion on which this promise was based is incorrect. What appears to have happened is simply this, that a more expanded portion of the meteor stream is now traversing the Earth's orbit, and that accordingly the passage of the Earth through the system

* The publication of this chart is unavoidably delayed.

+ My friend and former pupil, Mr. A. M. Worthington, of Trinity College, Oxford, has worked the whole question over again from the original data, and makes the orbit a hyperbola of small eccentricity, *i.e.* nearly parabolic.

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lasts longer than in former years, while, owing to the irregular constitution of the system, several successive hours may pass without any meteors being seen.

For, although the night of November 13-14, was not attended (in England and France at least) with any display of the Leonides, yet on the night of November 14-15, many meteors were seen at certain stations where the weather was favourable. Thus, at Alexandria, Prof. Parnisetti, and five assistants, obtained the following results :—

Between 10 and 11 P.M., Nov. 14,				3 meteors were counted.	
11	"	12	"	6	"
12	"	1 A.M.	"	19	"
1	"	2	"	23	"
2	"	3	"	84	"
3	"	4	"	100	"
4	"	5	"	95	"
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				300	

As the sky was not at any time quite clear, this result shows that between 2 and 5 a veritable meteoric display was in progress.

At Volpeglino, near Tortona, Signor Maggi observed 52 meteors (most of them Leonides) between 3.15 and 6.15 A.M. The sky was much clouded, however.

At Genoa, Professor Garibaldi counted more than 100 meteors between 8.15 P.M. Nov. 14, and 1.30 A.M. Nov. 15.

It is even more deserving of notice, however, that at Moncalieri on the night of November 16-17, no less than 128 meteors were counted, of which the majority were Leonides. The significance of this observation will be understood when it is remembered that the Earth had traversed nearly 3 millions of miles between the epochs of the observations made at Alexandria and Moncalieri.

It may be added that in 1870 Capt. Tupman had noticed that Leonides began to fall in considerable numbers two or three days before November 13-14.

It would appear that instead of discontinuing the observations altogether, what is now wanted is that a watch should be maintained during the hours between 10 P.M. and 6 A.M. (say) from November 10 to November 17. I fear this suggestion is not likely to be unanimously welcomed.

Prof. Denza remarks of the passage last year, that 'the meteor-cloud has appeared not only to be less dense, but displaced from its usual position, very turbid (*troublé*) and irregular; for the portion which the Earth traverses at present is but a remnant, and, as it were, a tenuous tail behind the more densely crowded central group.' 'It is to be inferred, also,' he adds, 'that the flight of meteors is extending itself gradually along its orbit,—a process which will in the long run cause the whole orbit to be occupied by cosmical matter, after which there will be displays of the meteors not merely at intervals of $33\frac{1}{4}$ years, but year after

year, and with about the same degree of richness, precisely as in the case of the August meteors, or Perseides, whence we can understand the great interest attaching to the study of these objects during the next few years, for the purpose of tracing the law according to which the progressive diminution of these displays proceeds, especially if we remember (as Prof. Schiaparelli, of Milan, has pointed out to me), that a fine shower was observed in 1818, that is to say, nearly midway between the great displays of 1799 and 1833.'

A General Comparative Table of Radiant-Positions and Duration of Meteor-Showers. By R. P. Greg, Esq., F.R.A.S.

The accompanying Table of Radiant-Positions and Epochs of Meteor-Showers is intended to show at a glance the comparative results of all the meteoric showers whose centres of radiation, in right ascension and north declination, and whose epochs have hitherto been approximately or definitely ascertained. The recent increased interest attached to meteoric science since Professor Schiaparelli's discovery of the intimate connexion between the orbits of comets and meteor-rings renders it most desirable that the scattered and laborious researches of various observers and collators should be brought together and synoptically arranged. This I have endeavoured to do in as brief and simple a manner as possible. Having due regard to the nature of the case, there results a greater amount of coincidence and resemblance than might have been expected from the reductions of nearly 6000 observations, independently of Leonides and Perseides, made by different observers in different countries, recorded during the last twenty years. Indeed the results are frequently remarkably coincident, when we consider how difficult it is to arrive, even in the case of the more frequently observed and better known Leonides and Perseides, at a precise radiant-point. It is even less simple to ascertain with anything like precision the extent and configuration of the radiant area when, as is frequently the case, it more or less diffusely occupies a region amongst the stars of some 10° or 20° in diameter. In some cases it is highly probable that the area is simply "diffuse;" in others it probably includes a series of minor or sub-radiants (the existence and origin of which have been ingeniously, and perhaps correctly, explained by Signor Schiaparelli*), and of whose existence I had myself expressed a suspicion, some years ago, in the Report of the British Association for 1868-9. The probability of the existence, also, of meteoric showers having a duration of some six weeks appears to be still further confirmed by the comparative table or catalogue now presented. (See *Proceedings of the British Meteorological Society* for January 1865.) Professor Heis (see the *Astronomische Nachrichten*, April 1867) was the first systematically to attempt to group and arrange centres of

* See the Report of the British Association Committee on Luminous Meteors, 1871.